THE

GENIUS OF MEDICINE

ANNUAL ADDRESS

—PRESENTED TO—

The Florida Medical State Association,

1882.

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PENSACOLA, FLA.

Reprinted from the July No. (1882) of the New Orleans Medical and Surgical Journal.

NEW ORLEANS:
TIMES-DEMOCRAT JOB PRINT, 58 CAMP STREET,
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Action and reaction are fundamental phenomena of the intellectual as of the physical world. The "method of nature," in all its phases strikes us the more we learn, by its exquisite simplicity and stupendous grandeur. To none other, need the profession of medicine yield the palm, in asserting its claims on humanity, for the light it has shed on that method. It is well for us occassionally to ponder over the influence of our colleagues, in the past and present. We lack historians. No busy practitioner, isolated from the learned in large cities, and deprived of the essential advantages of consulting libraries, can presume to unfold with precision the influence of medical thought on the human understanding. The theme is captivating. How does the history of man indicate the status of Medicine at different epochs ; and on the other hand, what has medicine radiated, from within its special limits of searching experiences and glowing energy, to comfort and advance mankind? I am proud to say that from the days of a pure empiricism, through an era of gloomy superstition, to the final adoption of the scientific method, physicians have ever been in the van amongst men of action. It is proverbial that throughout the world, medical students have ever been the promptest defenders of human liberties, the most valiant knights in assaulting with positive recklessness, the entrenched fastnesses of authority and dogmatism. The science of medicine is nothing unless pro-

gressive. Intellectual life amongst us has long since compelled the decent burial of many doctrines imposed on the world by an Aristotle or a Galen, a Boerhaave, or a Hahnemann. Dead and buried are all human fictions in medicine, and nothing stands but the solid and growing edifice of a truly inductive science. We have wearied with the rest of mankind of teleological research. Our pre-occupied hours are too short for vague imaginings in relation to the doctrine of final causes, but we have raised a structure on rocks, moulded by astute experimenters, and whose substrata are as broad as nature's entire domain, the *universe*. Ancient history reveals how much man suffered by confounding temporal with spiritual duties. Appeals to gods who ruled over the destinies of each particular organ resulted in never-ending disappointment. It is true that we are lost in astonishment at the vast knowledge indicated by the hygienic precepts of Moses. The social institutions of Egypt, the astute control of a reverent people, the rude awakenings due to plague out-breaks and famines, established rules of conduct and sanitary precepts over which we marvel and which we may well strive to enforce, in many respects, to-day. The Levites constituted an hereditary nobility, and were both the judges and the doctors of the people. Solomon, the most learned of men, wrote on the cure of diseases by natural means, and Ezekiah is charged with destroying this work, which interfered with the interests of the Levites. What a contrast if we pass from this to the contemplation of a pure idealism and its influence on medicine Maladies were ascribed to the fury of gods and godesses, Isis, symbolizing the Moon, was regarded as inducing diseases which recurred periodically. She restored her son Orus to life. Since it was her anger that afflicted men with disease, the Greeks compared her to Proserpine, Queen of Hell, or to the redoubtable Hecate.

Whenever freed from state succor and control, medicine raised its head, as in Palestine. In India, 1400 years before Christ, skilled writers compiled a summary of all medical works then in existence—the "*Ayur Veda*," the most ancient of the sacerdotal medical writings, and from this came Vaidya, a medical caste among the Hindoos. To Æsculapius, son of Apollo and Coronis, does Greek mythology ascribe the origin of medicine. Melampus was the first medical practitioner in Greece. The priests in charge of the Æsculapian temples were supposed to have powers imparted to them, such as the American Indians ascribe to their medicine men. Human curiosity

and ingenuity, amongst a people capable of vigorous mental growth, led to the priests recording the cases and cures coming under their daily observation. The most celebrated of the temples reared to the worship of Æsculapius were those of Rhodes, Epidaurus, Cnidos and Cos. In the latter place the immortal Hippocrates was born, B. C., 450 years. He was the son of Heraclides, a professed physician. Hippocrates is the true ancestor of experimental medicine. He examined the recorded cases, as set forth on the votive tables of the temples. His acute perception rendered him a shrewd statistician and bold generalizer. He perceived the periodicity of disease, and may be said to have formulated the law of "*Crises.*" A retrospective glance of the school of Cos, reminding us that Pericles and Socrates, then lived, and that Praxagoras and Herophilus led on to the great Alexandrian school of medicine, almost causes us to imagine that the great Grecians were as highly endowed mentally as the greatest medical philosophers of the 19th century. The unrivalled eminence of Greek art likewise would induce us to believe that man since then may actually have lost much of his cunning. But a broad survey of conflicts and conquests, since the days of Hippocrates, force on our acceptance the juster view that, notwithstanding periodical retrograde movements, human intellect and resources to-day enable the industrious amongst us far to out-strip the ancient Grecians. Isolation, accounts for the immortality of the great Grecians. No such fame can be the reward of greater achievements by the greatest of the host devoted now to our noble calling; we may well contrast the physicians of to-day with those of the Hippocratic period, as we compare the naturalists of the 19th century with those of the early dawn of the Christian era. There is nothing more startling than the atomic theory of Democritus. He visited Athens where Socrates and Plato lived, traveled far and wide to acquire knowledge, embodied in his Diakosmos, and started the germinal thought that nothing out of nothing came, and that matter was indestructible. For him *atoms* and empty space were alone existent. It is not my purpose to speak of Epicurian and Lucretian philosophy, but it is important that we should fix our attention to the fact, that at this period of intellectual activity and bold speculation, the first beginnings of the scientific method in medicine, advanced with the labors of mathematicians, like Pythagoras, and culminated in the Alexandrian School. Then "Euclid" wrote his "Elements" and made some advance in optics. Archimedes had propounded the

theory of the lever and the principles of hydrostatics. Astronomy was immensely enriched by the discoveries of Hipparchus, who was followed by the historically more celebrated Ptolemy. Anatomy had been made the basis of scientific medicine, and it is said by Draper that vivisection had begun. In fact, says "Tyndall," from whom I am quoting, "the science of Ancient Greece, had already cleared the world of the fantastic images of divinities, operating capriciously through natural phenomena. It had shaken itself free from that fruitless scrutiny by the internal light of the mind alone, which had vainly sought to transcend inference and reach knowledge of ultimate causes, instead of accidental observations with a purpose; instruments were employed to aid the senses, and scientific method was rendered in a great measure complete by the union of Induction and Experiment." Our forefathers, in their thirst for knowledge, were not particular as to how they acquired it, and it is said that during the reign of the first Ptolemy, criminals were sometimes dissected alive by physicians. In the days of Ptolemy the 2d, Philimus of Cos, a Greek physician of eminence, founded one of the earliest medical sects, the Empirici.

No figure in ancient history stands out so prominently as Aristotle's. He was son of an eminent physician, Nicomachus, and was born at Stagira, in Thrace, 384 years before Christ. His love for natural history was hereditary. In philosophy, he was Plato's pupil, Plato said, "Aristotle is the mind of my school." Plato and Aristotle contain all the speculative philosophy of Greece, but the influence of the last completely overshadowed that of his teacher, and for twenty centuries continued to exercise a tyrannic and pernicious sway over the minds of men. He taught that reason alone can form science. Experience being the basis of all science, reason was the architect. He opened the world again to speculation, which Socrates had suppressed. Without taking into consideration Aristotle's teaching and, in many senses, enervating example, it is impossible to comprehend the drift of the arts and sciences, including medicine, during the long period intervening between the Alexandrian school and the days of Bacon. The most striking instance of Aristotelian control over the minds of men, is afforded by Galen, born at Pergamus, A. D., 130. He compiled a cyclopædia of medical literature, the text book for upward of thirteen centuries.

During the so-called dark ages we can only glean data for a gloomy picture of medical progress. Prior to the Christian era, astrologers

and incantations were resorted to. Certain stars were supposed to rule over distinct parts of the human frame. Saints took the place of the stars with the Christian priesthood, and both stars and saints were alike prejudicial to the advance of medicine. In due time the priests, becoming wealthy, neglected the church, and the Council of Laodicea, A. D., 366, forbade their studying or practising astrology; but they continued to be the most popular doctors until the Lateran Council, held A. D., 1123, ordained that priests and monks should not attend the bedside of the sick in any other capacity than as ministers of religion. At another council, held in Rheims, A. D., 1131, monks were prohibited from frequenting schools of medicine. Successive injunctions and prohibitions tended to divorce the surgeon or physician from the priest, but the separation did not occur fully till a Bull was issued by Pope Innocent the Third, permitting those priests who practised medicine to marry. Ever since that time the professed physician has been a layman.

The dawn of modern medicine came with Mondini, the Anatomist of Bologna, early in the fourteenth century, and his pupil, Guy de Chauliac, in France, gave an immense impetus to surgery. Aristotelian methods were successfully counteracted by Ambroise Paré, who defied the schoolmen successfully, confronting their fallacies and false teachings by appeals to nature and the dissecting table.

In the fifteenth century, Leonardo da Vinci, the great Italian naturalist and artist, proclaimed that air was essential to combustion, and that no animal can exist in an atmosphere which is incapable of supporting combustion. Here was the earliest known theory established in ways not known to us, leading up to a rational understanding of the function of respiration. To Francis Bacon, born on the 22d of January, 1561, we owe the Novum Organum. He was the first to proclaim a philosophy of science, based on accurate verifications which Aristotle had ignored. His mind was antipathetic to all metaphysics, and he is justly entitled the Father of Positive Science. Now we can fully appreciate the wisdom of his declaration that Physics was "The Mother of all the Sciences." What physiologist can gainsay that? In his classical treatise on the subject of Heat, as well as in his Novum Organum, Lord Bacon maintained that the very essence of heat is motion and nothing else. He was the embodiment of the anti-Aristotelian school, He attacked Aristotle's philosophy as "only strong for disputations and contentions, but barren of

the production of works for the benefit of the life of man." He scorned the traditions of the past, but unfortunately for his reputation, he likewise held in contempt the researches of Copernicus and Gilbert, that brilliant physician, Dr. Gilbert, of Colchester, whose Physiologia Nova was published in 1600. Gilbert was appointed physician in ordinary to Queen Elizabeth, but a brighter diadem shone on his forehead as the discoverer of terrestrial magnetism. He introduced the name of pole to the extremity of the needle, as pointing towards each pole of the earth, and first spoke of electric force and electric attraction. He experimented on heat in relation to magnetism, and by his writings enlightened the curious in his field of research for two centuries after his death. He is not yet quite hidden from view, and let us not forget he was a practising physician. The Italians were in astronomy, physiology and the practice of medicine the most active followers of Bacon's method.

One of the least known to English readers, but most remarkable and illustrious of all the physiological investigators of the seventeenth century, was Francis Redi, born at Arezzo, on the 18th of February, 1626, a student of the University of Pisa, where he became doctor of philosophy as well as of medicine, and a physician of the court of Tuscany, acquiring not only local but European fame, beyond any of his contemporaries. He was a man of the highest culture, a writer of the purest Italian, a poet and philosopher, but devoted chiefly to experimental science and natural history. His treatise on vipers, his experiments on the reproduction of insects, his observations on living animals, all attest to the breadth and depth of his knowledge, as well as to his strict adherence to Bacon's method of verification. He belonged to the school of Galileo, and was inspired by the progressive spirit of his times as an academician of the illustrious Academy del Cimento. He overthrew the universal belief in insects being developed spontaneously as a result of putrefaction. In relation to snake poison, he described the glands secreting it, the tooth which introduces it into a wound and the harmlessness of the poison if passed into the stomach, without coming in contact with a sore. Redi may be fairly styled the Jonn Hunter of the Italian school in the seventeenth century. He animated and developed the true experimental method, which was so soon to prevail over Western Europe ; and take deep root in the British Isles. Historians tell us that with the entry of Charles the Second into Whitehall, modern England began. We find ourselves, says Green, "all at once among

the great currents of thought and activity, which have gone on widening and deepening from that time to this." The revolution led to all the infamy, intrigue and disorder which comes from a revulsion from strict discipline such as the Puritans established. But the Court and town were more deeply fouled than the people, whose increase and sound sense favored the growth of purer thought and solid science, as the basis of England's unrivalled greatness, and I may add of America's present and most glorious prospects. Kepler and Galileo were at this epoch creating modern astronomy, and Descartes revealed the laws of motion. The continent of Europe numbers many illustrious in physical, physiological and medical researches, whereas England counted, with Bacon and Gilbert, the illustrious Harvey. He was the pupil of Frabricius ab Aquapendente, at Padua, and with a profound knowledge of acquired truth, capped the pyramid of science with his great induction, the discovery of the blood's circulation. Redi's influence is perceived in the aphorism, "*omne vivum ex ovo.*" The doctrine of spontaneous generation was forever laid low. It has been repeatedly revived, but always to be refuted by experimental proof of the imperfect observations of its advocates. Aristotelian disciples were not fully extinguished. Science to this day is hindered by them; Stahl, likewise a physician, who flourished from 1660 to 1734, imposed on the world his doctrine of phlogiston. He declared this to be the only principle of combustibility. He descanted likewise on an immaterial essence—an organizing principle which he termed the "Anima" endowed with intelligence and pervading man. This anticipated Bœrhaave, who maintained that the living body was governed by "an universal catholic fluid," the most elastic principle in nature, termed by the Greeks "Animus Mundi.' With the establishment of the Royal Society in 1662, we have the era of Lower, Boyle, Hooke and Mayow, who laid the foundation for British preeminence in physiological science, by their researches on respiration. They demonstrated the absolute dependence of animals on the atmosphere they breathed. By sustaining artificial respiration, Hooke proved in 1664, that the essential phenomenon of respiration is the admission of air to the lungs, and Dr. Richard Lower, of Oxford, who had practiced transfusion, proved by opening the chest of living animals, the change occurring in the blood on the passage through the lungs from dark venous to bright arterial red. Hooke was the pioneer in the true theory of combustion which ten years later Mayow was to advocate. Dr. John Mayow, born in 1645,

in Cornwall, described, in 1694, the experiments which led him to conclude that atmospheric air contains a substance that he denominated Nitro-ærial spirit, which is consumed when bodies burn as well as when animals breathe. He placed animals under bell jars containing air and dipping them in water, he found that the volume of air gradually diminished. He believes that, in the process of respiration, the venous blood circulating in the lungs combined with the nitro-ærial spirit of the respired air, and that combination was attended with the evolution of heat, which served in part to maintain the animal temperature. He believes that in the process of respiration, gaseous impurities are removed from the blood.

Mayow supposed that the rusting of iron in air was due to its combination with nitro-ærial spirit, and he determined that when antimony is burned in it, it increases in weight in consequence of its having combined with the substance, whose existence he had surmised, and which was discovered, a century later, by Priestley and Scheele, namely oxygen.

Mayow died at 34 years of age, but his prolific brain and industry won for him the great distinction of being one of the earliest pioneers of Modern Chemistry. Much as medicine is reaping from the Chemical Laboratory to-day, she may claim a large share in initiating a sound chemical philosophy. In an essay on science and medicine, published in 1874, Dr. Arthur Gamgee says : "Aristotle had declared large animals respire, but that small ones do not, basing the latter statement on the supposed fact that insects do not breathe."

Boyle's experiments with the air pump (facilitated by Dr. Hooke's apparatus, which was a great improvement on Otto de Guerricke's of Magdeburg), proved however, the fallacy of the assertion and his physiological discovery was confirmed by the researches of the distinguished Italian anatomist, Malpighi, who describes the respiration of insects in a remarkable work on the silkworm, which he dedicated to the Royal Society in 1669, having been elected a Fellow but one year previously, and further, "whilst these researches were being carried out, Dr. Thomas Willis was adding to our knowledge of the Anatomy of the brain, being aided in his researches by Lower, and availing himself of the pencil of Sir Christopher Wren, and about the same time, another Fellow of the Royal Society, Clopton Havers, was contributing to our knowledge of the structure of bone." With the opening of the 18th century we have an edifying view of the

progress of medicine as studied in the Universities of Leyden and Edinburgh.

Hermann Boerhaave, appointed to the chair of medicine in the first, in 1709, proved a good teacher but loved hypothesis. Van Swieten and Haller rescued his school from any charge of barrenness, much as we know that his direct influence was not that of a Redi or Harvey. A far greater man, an equally potent teacher in the class-room, but a more solid guide in science established the reputation of the University of Edinburgh as a school of physic. William Cullen, who lived from 1710 to 1790, was first apprenticed to a physician, took his M. D. in Glasgow in 1740, practiced at Hamilton and was afterwards professor of Chemistry in the University of Glasgow. He was conspicuous for his attacks on what he called "*false facts.*" He was the most uncompromising searcher of fallacies in the laboratory. He had but one course to pursue when a statement or a novel observation struck him. He resorted to every expedient whereby he might determine its truth. Like Boerhaave, he was essentially devoted to the actual teaching of youth, and the lore buried with him was, in all probability, but imperfectly indicated by his writings. Essentially a physician, he was, to a far greater extent than is generally appreciated, Dr. Joseph Black's master and predecessor. Physicists were discussing the singular phenomenon attending the evaporation of liquids. Richmann and others had confused ideas of chemical combination with the air, inducing the cold attendant on the dispersion of volatile agents. Cullen experimented and proved that heat, and heat alone, sufficed for this change of state in matter. He likewise pointed out a direct relation between the cold produced and the volatility of the fluid used. He moreover said—"the cold is made greater by whatever hastens the evaporation and the sinking of the thermometer is greater as the air in which the experiment is made warmer, if dry at the same time." "Cold," he said, "is the effect of evaporation." The experimental inquiry is at the foundation of Black's and Watt's researches on latent heat. A great Russian, to whom Mr. John Gamgee has of late directed attention, Michael Lomonosow, at the period recognized "*the sufficient cause of heat* as *consisting in the motion of matter.*" Undoubted familiarity on the part of Cullen with contemporary research and with Richmann's labors, published in the same volume, of the Transactions of the Academy of Science of St. Petersburg, as Lomonosow's essays, would indicate that the greatest invention of modern times, *the steam engine*, was not born in the workshop, as practical mechanics insist,

but sprang from halls of science where James Watt met with his most congenial associates. A true theory of combustion was undoubtedly formulated by a physician and the greatest medical teacher of the Scotch school, whose influence in this respect has to this day been felt, was the active pioneer in researches without which the steam engine had remained inchoate for a long and indefinite period.

Dr. Hooke had been Newcomen's wisest counsellor and brought the data of Galileo and Torricelli to bear on the practical work of the millwright, but reliance on atmospheric pressure and wasteful processes, could alone be set aside by a better understanding of the laws of vaporization. In 1728, there was born in Bordeaux, France, of Scotch parents, Joseph Black, who pursued his studies in Glasgow, and in 1754 took his degree as Doctor of Medicine in the University of Edinburgh. At that time, according to Stahl's doctrine, plogiston, or a fire essence, was supposed to be the cause of the causticity of alkalies. Black proved that it depended on their combination with fixed air ; or what is now known as carbonic acid, a discovery which Lord Brougham declared was the result of "Incontestably, the most beautiful example of strict inductive investigation since the optics of Sir Isaac Newton." In 1756 he succeeded his own master, with whom he had pursued his laboratory researches, as chemical professor in Glasgow. In 1756, he attracted the world's attention by his splendid work on latent heat. It was also in 1756 that James Watt, after a year's residence in London, returned to Glasgow, still a youth in his 20th year. He was sheltered from the tyranny of Guilds, by Dr. Dick, who employed him to repair some apparatus belonging to the University. He was permitted to occupy three rooms and remain there in intellectual society till 1760. Black's favorite pupil, John Robinson, who was Watt's junior by three years, became his intimate friend and adviser, and in 1759 suggested the propulsion of carriages by steam and forcibly pointed out to Watt the importance of the steam engine. Chemistry was studied by Watt under Dr. Black, and for years the latter expounded to his class the phenomena of heat disappearance, during the conversion of water into steam, so that he was enabled to afford Watt a rational explanation, when the latter directed his attention to the fact, that it took a small quantity of steam to heat a very large volume of water. I shall not attempt to follow the detail of Watt's work. Suffice it to say that perceiving the greater amount of heat

held, weight for weight, by steam as compared with water, he devoted years of thought and successful practice, to avoiding every possible useless waste of that heat in developing power. Dr. Black, starting from Cullen's experiments, was not only the first discoverer of the doctrine of latent heat, but he likewise demonstrated that it requires a very different amount of heat to raise the temperature of different bodies one degree.

The French Academy of Surgery had, since 1731, encouraged and fostered the experimental method in medicine. It was raised "on the basis of chemical observation, physical researches and experiments." Thus the distinctly positive course of advancement, springing from Italy, invaded England, flourished with brilliant effect in France, and in William and John Hunter's hands again became consolidated in Great Britain. William Hunter was a pupil of Cullen. He essentially belonged to the experimental school. It were needless to encumber this sketch with special reference to John Hunter's labors. He was the master hand of his epoch. Names begin to thicken, and everywhere the medical mind is found exerting an immense influence on human progress. Scarpa, Porta, Amussat, Hewson, Astley Cooper, Travers, Arnott, and a host receding daily from view, owing to crowded generations of distinguished men, succeeding them in the medical world, sufficiently attest to the vast influence exercised by our profession on the development of man. The fact that Watt progressed so far and no further than a knowledge of laws relating to the production and condensation of steam then established by the Glasgow School of Physics and himself, has been forcibly put by Professor Osborne Reynolds. Watt dealt with steam at the pressure of the atmosphere. He was aware that high pressure steam could be expanded to advantage, but although he had some of the facts before him the advantage only became apparent on the discovery of further laws relating to steam, and these laws were not discovered until our own time." "For fifty years there was no advance, just as there had previously been none with the fire engine, and it was not until the further discoveries in the action of steam and heat" that there was a decided step towards increasing the pressures at which engines work. As far back as 1824 Sadi Carnot stated the law which controls present practice, but it lay barren until the science of Thermodynamics was born. And who assisted at that birth? I have not time to relate how Rumford, Davy and many more paved the way for the brightest epoch in the history of positive science, when the doctrine of energy,

foreshadowed by Dr. Young, led to the definite foundation and recognition of the true laws of heat, and the great theory of the conservation of force. And to whom does the world preeminently owe this? To a practising physician, Dr. Julius Robert Mayer, born at Heilbronn, November 25th, 1814. In 1840 he made a voyage on a Dutch freighter to Java, and it was the accident of bleeding a feverish patient in that country, and observing that the venous blood in the tropics was of much brighter red than in colder latitudes, that led him to investigations which forever identified his name with the birth of a new science. A science, in truth, the foundation for every other science, and which deals with what are termed nature's forces. Dr. Mayer's theoretical demonstration, of the equivalence of heat and work, was rapidly followed by Joule's experimental determinations of the mechanical equivalent of heat. Joule commenced in the spring of 1844, and in the course of his researches he justified one of Dr. Mayer's hypotheses, that in compressing air the heat evolved was equivalent to the power employed, and *vice versa*, the heat absorbed in rarefaction was found to be the equivalent of the mechanical power developed. If compressed air was expanded into a vacuum no mechanical power was produced and no absorption of heat expected or found. But when such compressed air, reduced to ordinary temperature by cold water, is made to move an engine piston, then it leaves the cylinder so cold that moisture is frozen. One of our colleagues, a great and worthy example of an industrious country practitioner, Dr. John Gorrie, of Apalachicola, Fla., based on this theory an ice machine, which he intended to use for the control of malaria and yellow fever. His patent is dated the 6th of May, 1851, and it is quite evident that, without a knowledge of Mayer's theory or Joule's demonstration, he designed a refrigerating machine based on the principle just indicated, and which anticipated numerous patents since secured by Kirk, Windhausen, Giffard, and a host of minor inventors. Dr. Gorrie proved himself a physicist as well as an engineer, and in his neighborhood many can testify to his exalted character as a man and success as a physician. These facts, bearing on the relation between the science of Medicine and Thermodynamics from Mayow to Gorrie, have been furnished me by one who has made these questions a special study. Professor John Gamgee, who, like Dr. Gorrie, wished to apply artificial cold to the prevention of yellow fever, has supplied me with these data and on his authority, I do not hesitate to endorse them.

It would be difficult for me to avoid touching on the one subject to which I have devoted much thought during my entire professional life. The views I promulgated five and twenty years ago of the purely naval origin of yellow fever have slowly but certainly gained ground, so that now they are sustained by our knowledge of the geographical distribution of disease, and, likewise, by the tendency of all research as to the nature of putrefactive poison. Sanitary science still compels the physician to become an accomplished physicist and chemist. No branch of natural history fails to enlarge his views, and develop methods calculated to promote the health and comfort of his fellowmen. Whether in the laboratory, tracing adulterations or evidence of poisoning, or as travelers studying physical geography and the distribution of diseases, in every clime, he finds the broad domain of pure science ever suggestive and essential to his advancement. Three great English names stand pre-eminent in the field of hygiene. They are Dr. William Farr, Dr. Edmund Parkes and Mr. John Simon. Their enthusiastic followers crowd not only Great Britain, but America, and circumstances have favored the organization of sanitary authorities in this country, to an extent that twenty years ago appeared impossible. This is due mainly to efforts of one modest, but resolute reformer.

We may briefly review that course of events as best known to us, and which have all occurred during my professional lifetime. From 1840 to 1856 was the formative period preparatory to concerted effort in favor of sanitary reform, on the part of the professional and scientific readers and observers of passing events. The decade of 1850-60 was that of agitation on the part of sanitarians who gradually moulded a public sentiment, which was an indispensable foundation for the abundant work since prosecuted. Massachusetts appointed its sanitary commission, which made an admirable report on the health of the people. The Quarantine and Sanitary Convention was organized and held annual meetings in 1857-8-9 and 1860. Delegates from most of the States attended, were inspired with the enthusiasm of new believers and returned to their homes to leaven public opinion, and encourage all in a conflict against disease. The four volumes of proceedings published by the convention, embodied discussions on the more popular questions of hygiene by some of the ablest physicians and publicists of that day. The first four years of the succeeding decade, 1860-70, were those of the late war between the States. Nevertheless, it was the opening epoch of American sanitary legisla-

tion. The war on the old order of things began in New York city. Its sanitary government was of the crudest and most contemptible kind. Its chief officer was a very ignorant politician, and its health inspectors were keepers of grog shops. Their qualifications may be estimated by the reply of one to the question : "What is hygiene?" asked by a legislative committee. He answered : "A mist arising from low grounds." Another was asked : "What is the best preventive of small-pox?" To which he replied : "Burn coffee in the room." On a health department officered by such men, New York expended $1,000,000 annually. At this stage a revolution was planned, pursued and proved successful. My friend, Dr. Stephen Smith, the present New York representative of the National Board of Health, was chiefly instrumental in organizing and directing the force which effected the reform. Through his efforts the leading physicians and citizens became interested and united.

When an intelligent people can be instructed, it is not difficult to upset combinations inimical to public interests; but at the outset, the most determined advance was most successfully resisted. Legislative committees would scarcely grant a hearing, but defeat only stimulated to greater endeavors. A Citizens' Association was organized, a fund raised and a complete system of sanitary inspection perfected for the purpose of preparing a report on the actual state of the city. Thirty-one sanitary districts were formed, and to each was appointed a first-class medical man. Every room from cellar to garret, of every accessible house, was thoroughly examined and an inventory taken of its contents, size and number of inhabitants. Back yards, stables, privies, dog kennels, cats, hens, geese, filth, everything were noted and set forth in records and maps partly colored. The whole was completed in three months at a cost of $22,000. It formed the subject of an elaborate report, a sanitary bill was drawn up, and at the ensuing meeting of the Legislature a renewed effort was made in behalf of reform. Dr. Stephen Smith presented the facts of the report, and Mr. D. B. Eaton the bill before the joint committee of the two houses. The report was completely successful, the committee being overwhelmed by the most startling discoveries and indisputable evidence of the gross insanitary state of the metropolis. The joint committee unanimously reported in favor of the bill. This soon became law. The public press gave great prominence to Dr. Stephen Smith's speeches, and the report of the Association, prepared for publication by Dr. E. Harris, was re-

garded by the best European authorities, such as Parkes and Pettenkofer, as a model of volunteer sanitary work. The law was modelled after the English Sanitary Act, and is probably the best piece of sanitary legislation in the world. And events now occurred calculated to consolidate public opinion in favor of such zealous intervention in the interest of public health. Cholera was introduced in New York when the new Board of Health had barely organized in 1866. The usual panic prevailed at first, but the new officers grappled resolutely with the plague, and it soon became apparent that the disease was under complete control. Each and every new case was summarily dealt with, the panic subsided, and the season passed with but a few scattering cases, though the usual virulence and mortality were witnessed in neighboring towns. The effect of this campaign was all that could be desired. The reputation of the new board became there and then established. Other cities, and notably Chicago, Washington and New Orleans organized on the same basis.

Now comes the last decade, from 1870 to 1880. Approaching the first year, Dr. Stephen Smith conceived the idea of uniting the elements which his industry and intelligence had called into active play, so as to have an annual conference of sanitarians from all parts of the Union. A quiet and unostentatious bearing, with a sincere devotion to work for their own sake, gave Dr. Smith the aid of all, and some challenged his boldness. At his own expense, and after extensive correspondence with all devoted to public hygiene in this country, he called by mutual consent a small meeting in New York, on the 18th of April, 1872. Out of this meeting grew the American Public Health Association. Dr. Smith was elected President four consecutive times, but on the fourth he positively declined acceptance. He desired to have a representative organization, and insisted on a general or national, rather than a personal policy, such as is usually so detrimental to public interests. Too much credit cannot be given to Dr. E. Harris, its first permanent Secretary, who devoted time and money freely to the early years of the Association. The work of the American Public Health Association had a most important bearing on the development of sanitary thought in this country. Under the stimulus of its discussions, boards of health, State and municipal, rapidly multiplied, and large numbers of earnest students were brought into the field of sanitary inquiry. In his inaugural address, as President of the Association, Dr. Smith stated the objects in view as "the advancement of sanitary science, and the promotion of or

ganizations and measures for the practical application of public hygiene." He discussed the actual potential longevity of man, and declared that the increased expectancy of life had not arisen from more successful methods of treating disease, but was rather due to man's advance in a higher civilization which enables him to live with less expenditure of vital force, and which leads him to seek his own highest welfare in the common efforts to promote the welfare of all.

The organization of the National Board of Health is a matter of too recent history to demand a statement here, but all may take courage from the origin of this National effort in attempting to initiate reforms such as Dr. Stephen Smith has been the main author of in the past. I wish specially to allude to the peculiar influence exerted by a few noble women in propounding and testing public health measures. The first was Lady Mary Wortly Montague, who accompanied her husband, the Ambassador, to the Court of Constantinople. She learned that the villagers in the neighborhood were in the habit of inoculating for the small-pox. She performed the operation on her son, and was afterwards the means of introducing it into England. This somewhat facilitated Edward Jenner's efforts, thwarted as they were by professional jealousy and gross prejudice. He, too, learned from the people that cow pox preserved them from the attacks, disfigurement and deaths incidental to small-pox, and his discovery constitutes one of the grandest illustrations of the value of experiments and induction. Two ladies of noble family had their children vaccinated and soon opposition ceased, favoring the general acceptance of Jenner's practice. These examples have been almost cast in the shade by the timely influence of Mrs. Elizabeth Thompson, of New York, in 1878. She sought wise advice, obtained it through Dr. Stephen Smith from Surgeon General Woodworth, and the result was the organization of the National Board of Health. We now feel that on the shores of the Gulf of Mexico future epidemics of yellow fever can only be rare and unimportant, unless as the result of gross negligence, which is likely to be brought home to the door of the delinquents. Yellow fever, as a devastating disease of the American seaport, may fairly be declared at an end.

I had hoped to have traced the history of American physician physicists. Time compels me to close, but we have in the Drapers living monuments of the great school of experiment and induction. Their names are linked with discoveries in Astronomy, Electricity, Light, Meteorology and in industrial arts such as Photography, almost

crowding from their vision teachings on Ethnology, Physiology and allied science. The old spirit survives, and in Dr. Gorrie proved itself fruitful on the shore sands of our State. The object of our association is to further the interests of our great profession. It is well to maintain a high standard of excellence in view, and it is to be hoped that the link shown to exist between the medical minds of the 17th, 18th and 19th centuries, and leading inventions of the 18th and 19th, may inspire all to hope for solid advances in science by increasing devotion and observation on the part even of overworked medical practitioners. The genius of medicine has proved itself resplendent in the past. Let each and all of us not dim the lens which, converging the rays of the past, almost threatens to blind us. We have but one course to pursue and that is, onwards.